

## EDITORIAL COMMENT

### Sudden Death in Mitral Regurgitation: Why Was I So Surprised?\*

Blase A. Carabello, MD  
*Houston, Texas*

In this issue of *JACC*, Grigioni et al. (1) report on 348 patients with mitral regurgitation due to a flail mitral leaflet. During a four-year follow-up, 25 of these patients (7%) died suddenly. I have had the opportunity to speak or write about valvular heart disease on literally hundreds of occasions over the past 20 years. While always emphasizing the risk of sudden death in a patient with aortic stenosis, I am virtually certain that I have never cautioned about the risk of sudden death in mitral regurgitation. When I initially read Grigioni et al.'s report (1), I was surprised and momentarily skeptical. Why should the patient with mitral regurgitation be at risk for sudden death? Then, as I reflected on the paper more carefully, I recognized that when the five asymptomatic patients who developed symptoms of heart failure before sudden death were added to the pool, 20 of the 25 patients who died suddenly had the symptoms of congestive heart failure at some point in their illness before sudden death. Scores of studies have demonstrated that the presence of congestive heart failure from either ischemic or dilated cardiomyopathy carries with it a high risk of sudden death. Although the patients reported by Grigioni et al. (1) were generally not as sick as those reported in heart failure studies, they followed the same trend (i.e., worsening heart failure class and lower ejection fraction were two of the major predictors of sudden death). Thus, I believe that the common thread that links the patient with mitral regurgitation to the risk of sudden death is the presence of heart failure compounded by the presence of left ventricular dysfunction.

See page 2078

**Risk of death due to coronary disease.** It is hard to know how many of these patients died as a result of coronary disease as an alternative explanation for their sudden death. In the group, the average age was 71 years of age, 84% were male and 56% smoked. Surely there would be some risk of sudden death from coronary disease in a study group so

constituted. Although the authors directly address this question, in fact, seven patients were suspected of having coronary disease and only four had it excluded on the basis of autopsy or angiography; the other 14 were left in question. Although these 14 patients apparently had no signs or symptoms of coronary disease, the bane of coronary disease is sudden death without any symptomatic or objective evidence that it is present. Thus, coronary disease may have played a role, but I also believe that mitral regurgitation and its manifestation of heart failure were primarily operative. *How should these new data affect our therapy for patients with mitral regurgitation and flail leaflet?*

**Asymptomatic patients with evidence with left ventricular dysfunction.** It is clear both from this study and previous studies that such patients require an operation irrespective of which form of mitral valve correction will ultimately be performed (2). Without therapy, such patients will develop irreversible left ventricular dysfunction and have increased mortality and persistent heart failure after the operation. The new data add the risk of sudden death to such patients, making operation an even more obvious choice. Therefore, in asymptomatic patients with mitral regurgitation who have a decrease in ejection fraction toward 0.60 (3) or an increase in left ventricular end-systolic dimension toward 45 mm (4,5), or if they develop pulmonary hypertension (and inevitable right ventricular dysfunction), the operation should be performed (6,7).

**Symptomatic patients with normal ventricular function.** The current data emphasize that heart failure is heart failure and its symptoms must be taken seriously. It is a clinical syndrome based not simply on ventricular performance, but rather on a constellation of signs and symptoms. Mortality is increased even when pure diastolic dysfunction causes the syndrome of heart failure (8), and now it is apparently also true (1) that mortality is increased in heart failure in mitral regurgitation even when systolic function is normal. The key message here is that we should not be assuaged by normal left ventricular ejection fraction and a small end-systolic dimension, once even mild symptoms develop (being a little symptomatic is like having a few termites). The study further raises the question about what to do if such a patient develops the symptoms of heart failure but is easily treated medically. Several patients in the current study died after apparently initially successful medical therapy. The current study suggests that symptoms of mitral regurgitation may be similar in gravity to those of aortic stenosis. That is, once a patient develops symptoms, he or she should be considered to have moved into the symptomatic category even if changes in medical therapy or life-style make the symptoms abate. One possible exception to this aggressive approach is in the patient with acute mitral regurgitation where compensatory hypertrophy has not yet occurred. Such

\*Editorials published in the *Journal of the American College of Cardiology* reflect the views of the authors and do not necessarily represent the views of *JACC* or the American College of Cardiology.

From the Department of Medicine, Baylor College of Medicine, and the Veterans Affairs Medical Center, Houston, Texas.

patients may go on to enjoy a long compensated period after initial decompensation. Because acuteness was not addressed here, this issue cannot be settled.

**Asymptomatic patients with normal left ventricular function with a high likelihood of valve repair.** An operation here can probably be performed at a 1% to 2% operative risk and does not entail the future risks inherent to prosthetic heart valves (9). As with our current approach to atrial septal defect therapy, correction of mitral regurgitation can be performed at low operative risk, without using prosthetic material, to prevent subsequent complications from occurring. Thus, "prophylactic repair" should be considered. To adopt this strategy, the eventual surgical procedure performed must be highly predictable. The atrial septal defect analogy obviously breaks down if the patient receives an unwanted prosthetic valve. Current data suggest predictability may be as low as 80%, although this probably varies from institution to institution (10).

**Asymptomatic patients with normal left ventricular function in whom repair is less than likely.** This is the most difficult group of patients to strategize. It is obviously tragic if an asymptomatic patient with normal left ventricular function receives a prosthetic valve and then suffers a complication from it. It must be noted that seven patients in Grigioni et al.'s study (1) had sudden death *after* the operation. Although we do not know what kind of operation was performed in these patients, it is likely that these were cases in which a prosthesis was inserted. In any case, although the operation diminishes the risk of sudden death in mitral regurgitation, it obviously does not prevent it. Therefore, at the current time it does not seem wise to commit the group of patients least likely to benefit from the operation (those asymptomatic patients with normal left ventricular function in whom the operation is likely to result in a prosthetic valve) to the operation. Here it is likely that operative risk, prosthetic valve complications and postoperative sudden death will overwhelm any advantage to the operation in reducing sudden death.

*Should these results be applied to patients with severe mitral regurgitation from causes other than flail leaflet?* The short answer is there is no way to know. If there is some unknown aspect of a flail leaflet that confers increased mortality, the answer would be no; if it is the pathophysiologic mechanism itself, the answer is probably yes. Further study is clearly necessary.

**Conclusions.** Heart failure is bad. Whether it accrues from systolic dysfunction, diastolic dysfunction or now from mitral regurgitation, the symptoms of congestive heart failure are a warning that the patient possessing them is at risk of cardiac death and sudden cardiac death. The worse the symptoms and the worse the left ventricular dysfunction, the worse the prognosis. Even if symptoms are transient, they may presage a disastrous outcome. The therapy for valvular heart disease has evolved toward a progressively more aggressive strategy for earlier and earlier surgery. The study by Grigioni et al. (1) adds still greater momentum to this trend.

---

**Reprint requests and correspondence:** Dr. Blase A. Carabello, Veterans Affairs Medical Center, Medical Service (111), 2002 Holcombe Boulevard, Houston, Texas 77030. E-mail: blaseanthony.carabello@med.va.gov.

---

## REFERENCES

1. Grigioni F, Enriquez-Sarano M, Ling LH, et al. Sudden death in mitral regurgitation due to flail leaflet. *J Am Coll Cardiol* 1999;34:2078-85.
2. Carabello BA. Mitral valve regurgitation. *Curr Probl Cardiol* 1998;23:202-41.
3. Enriquez-Sarano M, Tajik AJ, Schaff HV, et al. Echocardiographic prediction of survival after surgical correction of organic mitral regurgitation. *Circulation* 1994;90:830-7.
4. Wisenbaugh T, Skudicky D, Sareli P. Prediction of outcome after valve replacement for rheumatic mitral regurgitation in the era of chordal preservation. *Circulation* 1994;89:191-7.
5. Zile MR, Gaasch WH, Carroll JD, et al. Chronic mitral regurgitation: predictive value of preoperative echocardiographic indexes of left ventricular function and wall stress. *J Am Coll Cardiol* 1984;3(Pt. 1):235-42.
6. Hochreiter C, Niles N, Devereux RB, et al. Mitral regurgitation: relationship of noninvasive descriptors of right and left ventricular performance to clinical and hemodynamic finds and to prognosis in medically and surgically treated patients. *Circulation* 1986;73:900-12.
7. Crawford MH, Soucek J, Oprian CA, et al. Determinants of survival left ventricular performance after mitral valve replacement: Department of Veterans Affairs cooperative study on valvular heart disease. *Circulation* 1990;81:1173-81.
8. Vasan RS, Benjamin EJ, Levy D. Prevalence, clinical features, and prognosis of diastolic heart failure: an epidemiologic perspective. *J Am Coll Cardiol* 1995;26:1565-74.
9. Reul RM, Cohn LH. Mitral valve reconstruction for mitral insufficiency. *Prog Cardiovasc Dis* 1997;39:567-99.
10. Hellemans IM, Pieper EG, Ravelli AC, et al. Prediction of surgical strategy in mitral valve regurgitation based on echocardiography: Interuniversity Cardiology Institute of the Netherlands. *Am J Cardiol* 1997;79:334-8.